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# TRANSMITTAL FORM

*(to be used for all correspondence after initial filing)*

| | |
|---|---|
| Application Number | 10/017,833 |
| Filing Date | December 12, 2001 |
| Inventor(s) | Alan Glen SOLHEIM et. al. |
| Group Art Unit | 2613 |
| Examiner Name | David C. Payne |
| Attorney Docket Number | 129250-002052/US/CPA |

ENCLOSURES *(check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Response
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
- ☐ Letter to the Official Draftsperson and _____ Sheets of Formal Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Change of Correspondence Address and Revocation/POA
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
- ☐ After Allowance Communication to Group
- ☐ LETTER SUBMITTING APPEAL BRIEF AND APPEAL BRIEF (w/clean version of pending claims)
- ☒ Appeal Communication to Group *(Notice of Appeal, **Appeal Brief (corrected)**, Reply Brief)*
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) *(please identify below)*:

Remarks

**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

| | | | |
|---|---|---|---|
| Firm or Individual name | CAPITOL PATENT & TRADEMARK LAW FIRM, PLLC | Attorney Name John E. Curtin | Reg. No. 37,602 |
| Signature | | | |
| Date | November 13, 2006 | | |

**IN THE U.S. PATENT AND TRADEMARK OFFICE**



| | |
|---|---|
| Application No.: | 10/017,833 |
| Filing Date: | December 12, 2001 |
| Applicant: | Alan G. Solheim et al. |
| Group Art Unit: | 2613 |
| Examiner: | David C. Payne |
| Title: | WAVELENGTH ASSIGNMENT IN AN OPTICAL WDM NETWORK |
| Attorney Docket: | 129250-002052/US/CPA |

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## APPELLANTS' BRIEF ON APPEAL (Corrected)

**MAIL STOP APPEAL BRIEF - PATENTS**
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

November 13, 2006

In response to the Notice mailed October 11, 2006 requesting correction of informalities in the Appellants' original appeal brief, the Appellants submit the following corrected brief.

## TABLE OF CONTENTS

**APPELLANTS' BRIEF ON APPEAL**

## I. REAL PARTY IN INTEREST:

The real party in interest in this appeal is Lucent Technologies Inc. Assignment of the application was submitted to the U.S. Patent and Trademark Office and recorded at Reel 015070, Frame 0893.

## II. RELATED APPEALS AND INTERFERENCES:

There are no known appeals or interferences that will affect, be directly affected by, or have a bearing on the Board's decision in this Appeal.

## III. STATUS OF CLAIMS:

Claims 1-36 are pending in the application. Claims 1, 18, 21, 25 and 33 are written in independent form.

Claims 1-6 and 8-36 were finally rejected under 35 U.S.C. §103(a) in a Final Office action mailed April 4, 2006 ("Final Office Action"). Claim 7 has been indicated as allowable if rewritten in independent form to include the features of its base independent claim (claim 1). For purposes of Appellants' initial brief, any issues regarding claim 7 will not be addressed; the Appellants explicitly reserving their right to raise any issues regarding claim 7 in subsequent papers during this appeal process or in subsequent responses before the Board or Examiner.

## IV. STATUS OF AMENDMENTS:

A Request for Reconsideration ("Request") was filed on June 2nd, 2006. In an Advisory Action dated June 26, 2006 ("Advisory") the Examiner stated that the Request was considered but did not place the application in condition for allowance.

## V. SUMMARY OF CLAIMED SUBJECT MATTER:

### (i) Overview of the Subject Matter of the Independent Claims

In general, the present inventions are directed at methods and systems for optimizing the performance of optical connections, most of which include one or more regenerators, in wavelength switched optical networks. More particularly, the claimed inventions help extend the "reach" of wavelength division multiplexed (WDM) optical networks by more effectively assigning wavelengths to paths of a WDM network based on wavelength performance data (see, for example, the Specification page 15, lines 21-29). The subject matter of the independent claims is as follows (specification citations follow in parentheses).

Independent claim 1 reads as follows:

**1. A method of optimizing the performance of a connection in a wavelength switched optical network, comprising:**

**for all wavelengths available for transporting user signals in said network, storing wavelength performance data in a wavelength performance database;**

**selecting a path with one or more regenerator sections; and**

**assigning a set of wavelengths to said path based on said wavelength performance data.**

Support for claim 1 can be found, for example, on the following pages of the Specification: page 10, lines 19-27 and Fig. 2a (attached); page 11, line 26 to page 12, line 4 and Fig. 2B (attached); page 13, lines 1-18 and Fig. 3 (attached); page 16, line 1 to page 17, line 9 and Fig. 5 (attached).

Claim 10 reads as follows:

**10. In a wavelength switched optical network, a method of assigning a set of wavelengths to a path with one or more regenerator sections, comprising:**

**assigning a wavelength to a regenerator section based on the length of said regenerator section and wavelength performance data;**

**determining a regenerator section performance parameter for each said regenerator section and a path performance parameter for said path;**

**attempting to establish a connection along said path whenever said path performance parameter is within a range defining a specified class of service.**

Support for claim 10 can be found, for example, on the following pages of the Specification: page 14, lines 21-26; page 5, line 21 to page 7, line 1; page 19, line 28 to page 20, line 4; page 22, line 22 to page 23, line 4, and at least Figure 3 (attached).

Claim 18 reads as follows:

**18. A method of optimizing connections in a wavelength switched optical network, comprising:**

**determining a reach-wavelength correspondence for all wavelengths available for transporting user signals in said network and storing said correspondence in a wavelength performance database;**

**measuring a performance parameter for each wavelength available in said network and storing said measured performance parameter in a measurement database, together with link and wavelength identification information; and**

**assigning a set of wavelengths to a path according to said correspondence and said measured performance parameter.**

Support for claim 18 can be found, for example, on page 17, lines 10-11; page 18, lines 21-22; and page 19, line 11 to page 20, line 4 of the Specification.

Claim 21 reads as follows:

**21. In a network and element management system of the type including a routing platform, a connection optimization system comprising:**

**a wavelength performance database for storing wavelength performance data for each wavelength available in said network; and**

**a performance calculator for calculating a path performance parameter based on network connectivity information and measured path performance data; wherein said routing platform establishes a connection along a path selected based on said wavelength performance data and said path performance parameter.**

Support for claim 21 can be found, for example, on page 12, lines 20-21; page 13, lines 10-18; page 14, line 21 to page 15, line 2 of the Specification as well as on the pages of the Specification referred to with respect to claims 1 and 18 above.

Claim 25 reads as follows:

**25. A method of optimizing connections in a wavelength switched optical network, comprising:**

**connecting an optical signal analyzer to a plurality of measurement points in said network for automatically collecting on-line measured performance data; and**

**selecting a path for a connection based on said measured performance data.**

Support for claim 25 can be found, for example, on page 14, lines 9-16 and of the Specification.

Finally, independent claim 33 reads as follows:

**33. A method of optimizing connections in a wavelength switched optical network, comprising:**

**for a regenerator section of a path, modifying operation of a specified wavelength for increasing the reach of said selected wavelength; and**

**controlling operation of all other wavelengths passing through said specified regenerator section for maintaining the performance data of each said all other wavelengths on said paths within a respective range.**

Support for claim 33 can be found, for example, on page 20, line 11 to page 24, line 7 of the Specification and Fig. 8 (attached).

It should be understood that in order to make the overview set forth above concise, and thus useful to the members of the Board, the Appellants have noted only some of the disclosure from the Specification that supports the independent claims in the overview above. Said another way, the disclosure that has been included, or referred to, above only represents a portion of the total disclosure set forth in the Specification that supports the independent claims.

**(ii) The Remainder of the Specification Also Supports the Claims**

The Appellants note that there is additional disclosure that also supports the independent and dependent claims. Further, by presenting the disclosure above the Appellants do not represent that this is the only evidence that supports the independent claims nor do Appellants necessarily represent that this disclosure can be used to fully interpret the claims of the present invention. Instead, this disclosure is an overview of the claimed subject matter.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL:

Appellants seek the Board's review and reversal of the Examiner's rejection of claims 1-6 and 8-36 under 35 U.S.C. §103(a).

## VII. ARGUMENTS:

### A. The Section 103 Rejections

Claims 1-6 and 8-37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Levandovsky et al., U.S. Patent Publication No. 2002/0063915 ("Levandovsky") in view of an article by Banerjee et al. ("Banerjee"). Appellants respectfully disagree for at least the following reasons.

**(i) Neither Reference discloses or suggests the assignment of a wavelength based on wavelength performance data as in claims 1-20**

Initially, the Appellants note the acknowledgment by the Examiner that Levandovsky does not disclose the assignment of wavelengths to a path based on wavelength performance data. To make up for this deficiency the Examiner relies on Banerjee. However, instead of disclosing or suggesting the assignment of wavelengths to a path based on wavelength performance data, Banerjee assigns *a particular number* of wavelengths to a network based on the number of nodes in an entire network. That is, Banerjee is not concerned with the assignment of specific wavelength(s) <u>to a specific path</u> <u>based on wavelength performance data</u> as in claims 1-20 of the present invention. Instead, Banerjee appears to only be concerned with selecting the number of wavelengths (e.g., minimum number) that can be assigned to an entire network without regard to the performance of the assigned wavelengths.

**(ii) Neither Reference discloses or suggests a wavelength performance database for storing wavelength performance data as in claims 21-24.**

In the Final Office Action the Examiner states that the "modified invention" (i.e., the modification of Levandovsky with Banerjee) "is not explicit concerning the use of a database." Appellants interpret this statement as an acknowledgment that the combination of Levandovsky and Banerjee does not disclose or suggest the inventions in claims 21-24.

Nonetheless, the Examiner rejected these claims stating: "However, it would have been obvious to one of ordinary skill in the art at the time of invention [sic] that the execution of a [routing and wavelength assignment]

RWA must tally and keep track of a plurality of data which would be stored in memory and software."

Initially, the Appellants note that the present claims are not directed at the "RWA" (i.e., technique) disclosed in Banerjee. Instead, the wavelength performance database of claims 21-24 stores wavelength performance that is used to establish a connection along a path selected based on said wavelength performance data and a path performance parameter. As noted above, Banerjee is not concerned with the assignment of specific wavelength(s) to a specific path based on wavelength performance data. Rather, Banerjee appears to only be concerned with the selection of a minimum number of wavelengths that can be assigned to an entire network without regard to the performance of the assigned wavelengths. Thus, any database suggested by Banerjee would not include wavelength performance data as in claims 21-24.

Absent any evidence related to Banerjee's disclosure or suggestion of the claimed wavelength performance database the Appellants respectfully submit that the Examiner has not set forth a *prima facie* case of obviousness.

**(iii) Neither Reference discloses or suggests an optical spectrum analyzer that is used in selecting a path for a connection based on measured performance data as in claims 25-32.**

Levandovsky explicitly discloses the use of bit error rate (BER) to "validate" (i.e, accept or reject) a path. Optical spectrum analyzers (OSAs) do not measure BER, nor would a device or method that measures BER suggest the use of an OSA to one of ordinary skill in the art.

Further, the techniques disclosed in Banerjee do not appear to use, or suggest the usage of, OSAs. Instead, the measurements made in Banerjee relate to congestion, not wavelength performance.

In sum, neither reference appears to disclose or suggest the OSAs as in claims 25-32.

**(iv) Neither Reference discloses or suggests modifying the operation of a specified wavelength to increase the reach of a selected wavelength as in claims 33-36 or determining a reach-wavelength correspondence as in claims 18- 20.**

Levandovsky is explicitly directed at the validation of a path based on a use of bit error rate (BER). It is wholly unrelated to the determination of a reach wavelength correspondence or increasing the reach of a selected wavelength.

Similarly, the techniques disclosed in Banerjee are likewise unrelated to to increasing the reach of a selected wavelength or the determination of a reach wavelength correspondence.

In sum, neither reference appears to disclose or suggest the modification of the operation of a specified wavelength to increase the reach of a selected wavelength as in claims 33-36 or the determination of a reach-wavelength correspondence as in claims 18- 20.

**(v). Neither Reference discloses or suggests the assignment of a wavelength to a regenerator section of a path as in claims 2, 4, 9, 10-17 and 33-36.**

Claims 2, 4, 9, 10-17 and 33-36 each include one or more features that involve wavelength assignment applied to a "regenerator section of [a] path". For example, claim 2 selects "a wavelength from said wavelength performance database based on connectivity data for said regenerator section available from a topology database".

In contrast, neither Levandovsky nor Banerjee, taken separately or in combination, discloses or suggests the assignment of wavelengths to regenerator sections of a path.

**(vi). Conclusion:**

In sum, the Appellants respectfully submit that the subject matter of claims 1-6 and 8-36 would not have been obvious to one of ordinary skill in the art at the time the present application was filed based on a reading of the disclosures in Levandovsky, taken separately or in combination with, those in Banerjee for the reasons stated above.

Accordingly, the Appellants respectfully request that the members of the Board reverse the Examiner's rejections and allow claims 1-6 and 8-37.

Respectfully submitted,

Capitol Patent & Trademark Law Firm, PLLC

By: ______________________________

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## VIII. CLAIMS APPENDIX

### LISTING OF CLAIMS

1. A method of optimizing the performance of a connection in a wavelength switched optical network, comprising:

for all wavelengths available for transporting user signals in said network, storing wavelength performance data in a wavelength performance database;

selecting a path with one or more regenerator sections; and

assigning a set of wavelengths to said path based on said wavelength performance data.

2. A method as claimed in claim 1, wherein said step of assigning comprises:

(a) for each regenerator section of said path, selecting a wavelength from said wavelength performance database based on connectivity data for said regenerator section available from a topology database;

(b) determining a path performance parameter;

(c) establishing said connection along said path whenever said path performance parameter is better than a threshold; and

(d) otherwise, selecting a further path and repeating steps a) to c).

3. A method as claimed in claim 2, wherein said path performance parameter is the Q factor.

4. A method as claimed in claim 2, wherein said step of determining comprises:

identifying all optical devices connected in said path from said topology database;

importing measured performance data for said path and device specifications for said optical devices; and

calculating said path performance parameter using said measured performance data and said device specifications.

5. A method as claimed in claim 1, wherein said wavelength performance data comprises a correspondence between attainable reach for each wavelength available in said network and a plurality of fiber types.

6. A method as claimed in claim 5, wherein said wavelength performance data further includes launch power-reach information for all wavelengths available in said network.

7. A method as claimed in claim 1, wherein said step of storing includes grouping all wavelengths available in said network into bins of reach, each bin corresponding to a different range of reach distances, and categorizing the wavelengths within a bin by fiber type.

8. A method as claimed in claim 1, further comprising determining a worst performing wavelength of said set of wavelengths and upgrading said connection by replacing said worst performing wavelength.

9. A method as claimed in claim 2, wherein said wavelength performance data includes the wavelength natural reach for all wavelengths available in said network for a plurality of fiber types, and said connectivity data includes the length of said regenerator section.

10. In a wavelength switched optical network, a method of assigning a set of wavelengths to a path with one or more regenerator sections, comprising: assigning a wavelength to a regenerator section based on the length of said regenerator section and wavelength performance data;

determining a regenerator section performance parameter for each said regenerator section and a path performance parameter for said path; attempting to establish a connection along said path whenever said path performance parameter is within a range defining a specified class of service.

11. A method as claimed in claim 10, further comprising:

for a specified regenerator section of said path, modifying operation of a selected wavelength for increasing the reach of said selected wavelength; and controlling operation of all other wavelengths passing through said specified regenerator section for maintaining a respective wavelength performance data for said respective other wavelengths within a respective range.

12. A method as claimed in claim 11, wherein said step of modifying comprises adjusting a tunable parameter of a device of said specified regenerator section.

13. A method as claimed in claim 12, wherein said tunable parameter is one of gain, dispersion or both.

14. A method as claimed in claim 11, wherein said step of modifying comprises controlling the launch power of said selected wavelength.

15. A method as claimed in claim 10, wherein said step of assigning comprises mapping a transmitter to said wavelength according to reach performance of said transmitter.

16. A method as claimed in claim 10, wherein said step of assigning comprises mapping a receiver to said wavelength according to the performance of said receiver.

17. A method as claimed in claim 10, further comprising replacing said selected wavelength with a different wavelength from a different transmission band from that of said selected wavelength.

18. A method of optimizing connections in a wavelength switched optical network, comprising:

determining a reach-wavelength correspondence for all wavelengths available for transporting user signals in said network and storing said correspondence in a wavelength performance database;

measuring a performance parameter for each wavelength available in said network and storing said measured performance parameter in a measurement database, together with link and wavelength identification information; and

assigning a set of wavelengths to a path according to said correspondence and said measured performance parameter.

19. A method as claimed in claim 18 wherein said step of measuring comprises, for each node of said network:

determining all free wavelengths that are not used for live traffic exiting said node;

for each said free wavelength, setting up a test connection between a transmitter at said node and a next receiver; and

measuring said performance parameter for all said test connections.

20. A method as claimed in claim 19, further comprising storing said performance parameter in a measurement database.

21. In a network and element management system of the type including a routing platform, a connection optimization system comprising:

a wavelength performance database for storing wavelength performance data for each wavelength available in said network; and

a performance calculator for calculating a path performance parameter based on network connectivity information and measured path performance data; wherein said routing platform establishes a connection along a path selected based on said wavelength performance data and said path performance parameter.

22. A system as claimed in claim 21, wherein said path performance parameter includes the cost of said path and the Q factor of said path.

23. A system as claimed in claim 21 further comprising:

a measurement database for storing measured performance data for each regenerator section of said network; and

an interface between said measurement database and a plurality of optical devices of said network for transmitting said measured performance data from said devices to said measurement database.

24. A system as claimed in claim 21, further comprising a wavelength exerciser for setting-up test connections on all regenerator sections, for each wavelength unused on said regenerator section to populate said measurement database with measured data.

25. A method of optimizing connections in a wavelength switched optical network, comprising:

connecting an optical signal analyzer to a plurality of measurement points in said network for automatically collecting on-line measured performance data; and

selecting a path for a connection based on said measured performance data.

26. A method as claimed in claim 25, further comprising collecting a plurality of further performance data from an optical device connected in said path.

27. A method as claimed in claim 26, wherein said optical device is an optical amplifier and said further performance data is one or more of span gain/loss, power level and reflections level.

28. A method as claimed in claim 26, wherein said optical device is an optical amplifier and said further performance data is one or both of the Raman power and Raman gain.

29. A method as claimed in claim 26, wherein said optical device is a transmitter and said further performance data is the launch power.

30. A method as claimed in claim 26, wherein said optical device is a receiver and said further performance data is one or more of the sensitivity level, BER, Q factor, and eye opening.

31. A method as claimed in claim 26, wherein said optical device is a receiver and said further performance data is the link chromatic dispersion.

32. A method as claimed in claim 25, wherein said measured performance data include power levels and noise levels measured in each said respective measurement point for each wavelength traveling along said path.

33. A method of optimizing connections in a wavelength switched optical network, comprising:

for a regenerator section of a path, modifying operation of a specified wavelength for increasing the reach of said selected wavelength; and

controlling operation of all other wavelengths passing through said specified regenerator section for maintaining the performance data of each said all other wavelengths on said paths within a respective range.

34. A method as claimed in claim 33, wherein said step of modifying comprises adjusting the launch power of said specified wavelength until a performance parameter of said regenerator section is within an operational range.

35. A method as claimed in claim 33, wherein said step of modifying comprises changing the gain/loss of said specified wavelength.

36. A method as claimed in claim 33, wherein said step of controlling includes selecting said other wavelengths to provide greater wavelength spacing.

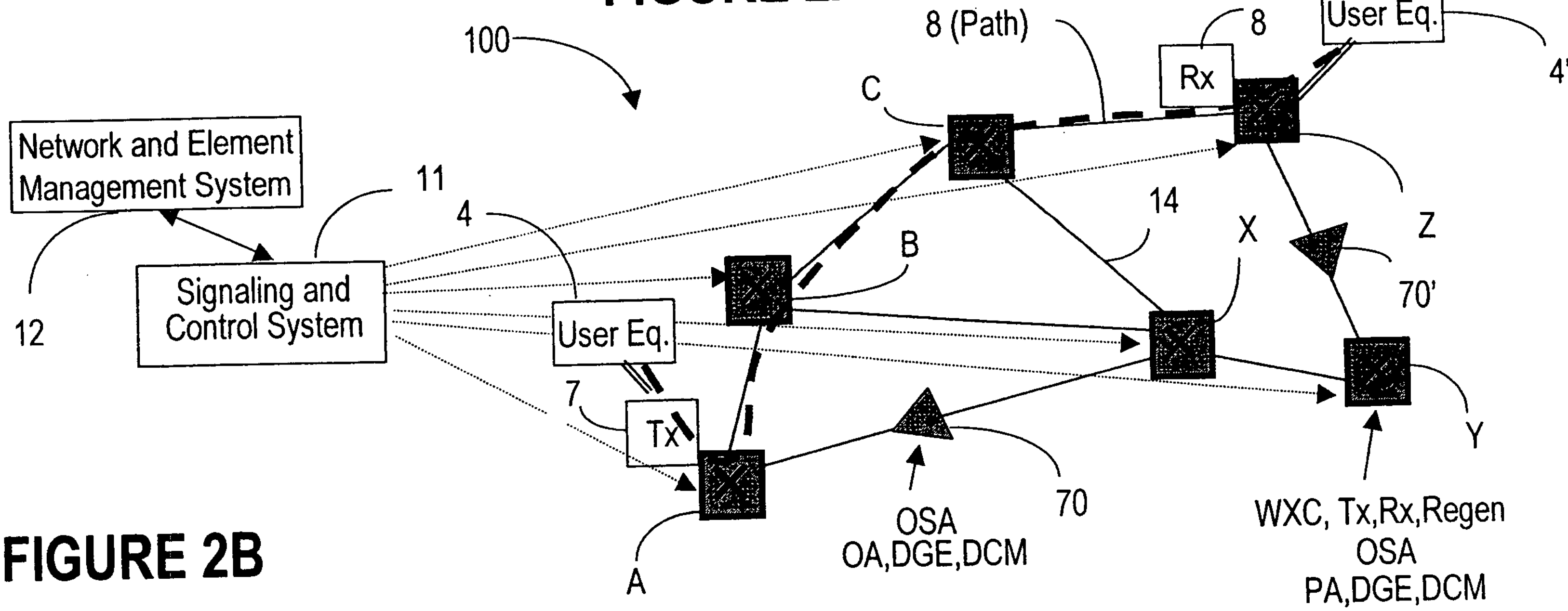
## IX. EVIDENCE APPENDIX

None.

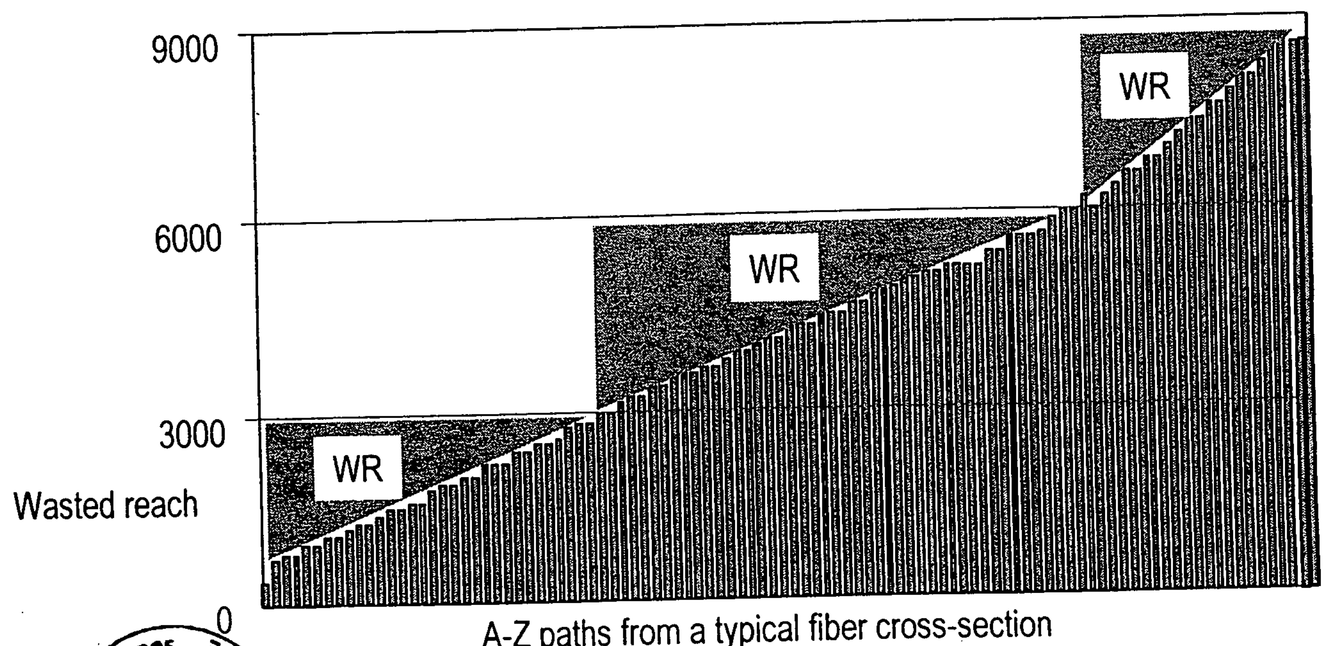
## X. RELATED PROCEEDINGS APPENDIX

None.

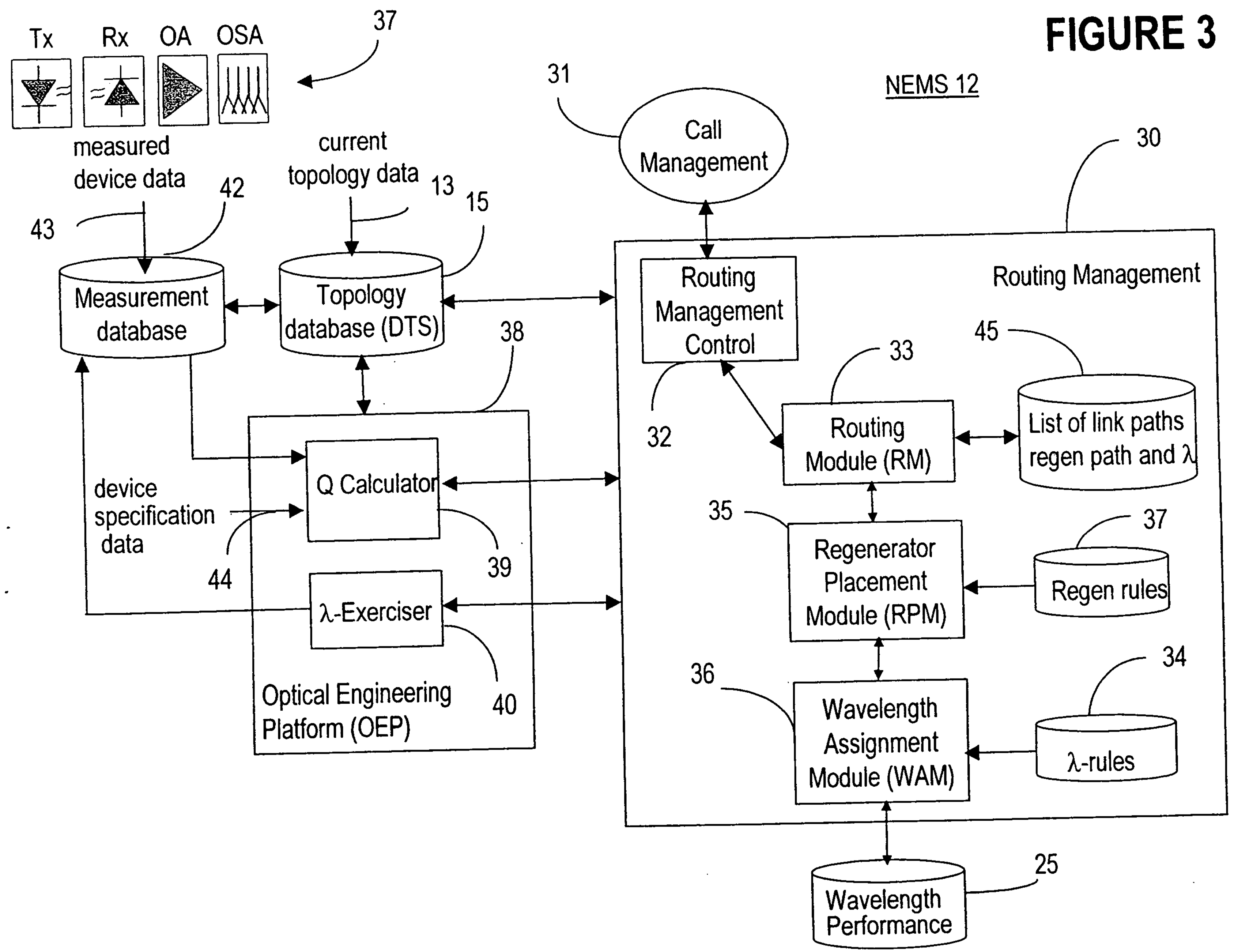
# FIGURE 2A




# FIGURE 2B



# FIGURE 3



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Routing
Management
Control
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Module (RM)
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regen path and λ
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Performance

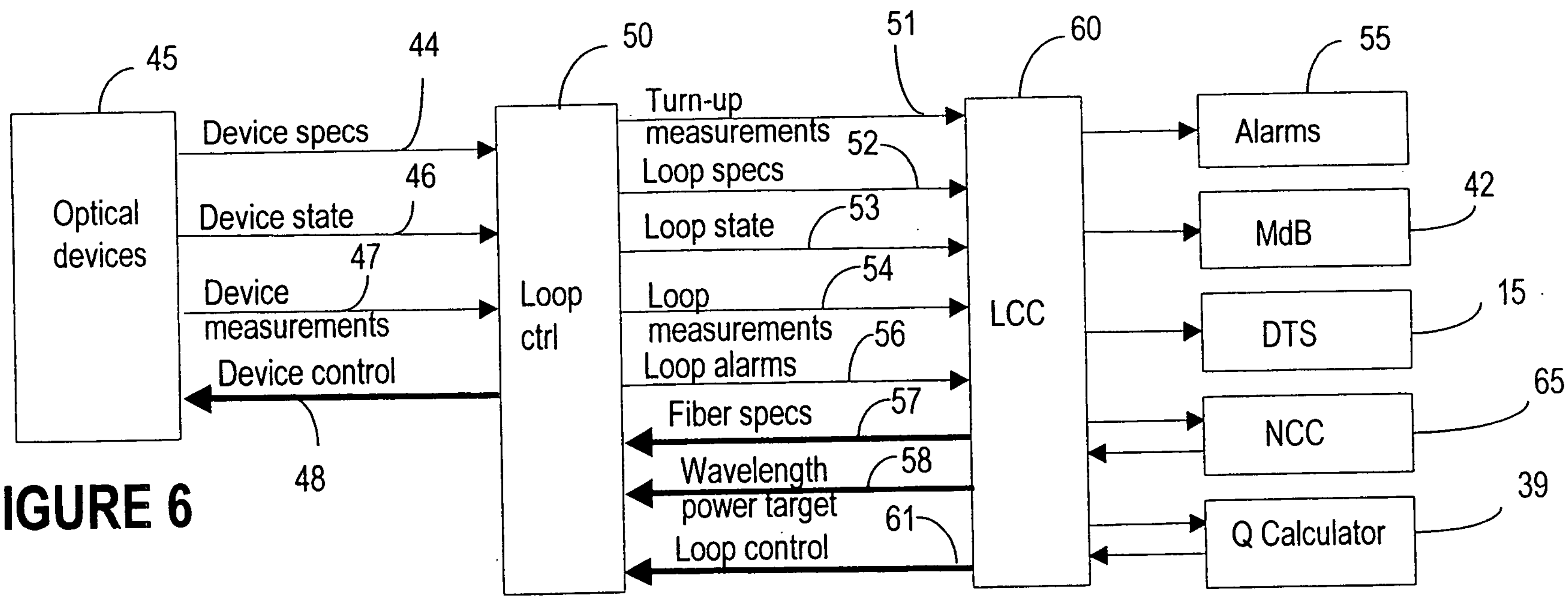


FIGURE 6

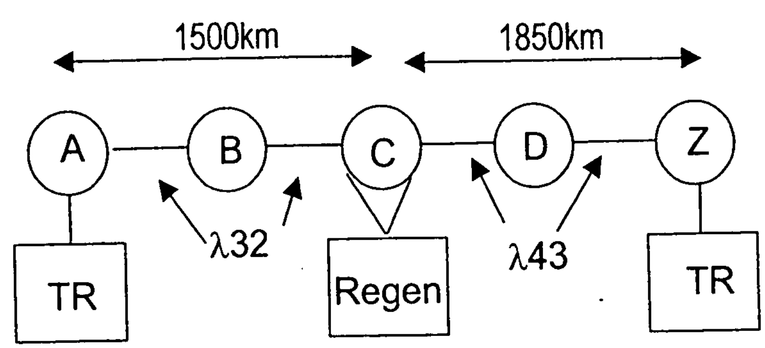


FIGURE 8